

Excerpt from Preface

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Most men who have profoundly assisted the development of science have required four types of skills. First, the ability to recognize and to define important problems susceptible to scientific elucidation, and to define them clearly; that is, to see distant goals clearly and to formulate strategy. Second, the tactical ability to conceive and conduct experiments sufficiently limited in scope to be rigorous, but advancing science according to the general strategy. Third, the innovative ingenuity and technical skill needed for the actual conduct of elegant experiments. Fourth, the ability to see how the results of experiments contribute to understanding, and to use the results to guide the tactics of future experiments. Most scientists have one or two of these skills, but few have all four; most have one or more glaring deficiencies. There are hundreds of reports in the *Journal of Comparative and Physiological Psychology* which give evidence of clear distant goals and technical skill but which show inadequate tactics. There are dozens of reports in the *Journal of the Experimental Analysis of Behavior* (a younger journal) which show experimental skill and the ability to recognize results, but which fail to advance science appreciably because they cannot be seen to advance or modify understanding in the broader picture. The different types of skills can be added to a common pool in collaborative work between people. But when all the skills are present in an individual, they are mutually enhanced, so that the scientific potency of the individual is far greater than that of four people, each contributing one of the skills. Skinner has all four skills and in unusual measure. In the contemporary academic vernacular,

he is very bright, good in the lab, good with his hands, and sharp: witness the theoretical papers of the thirties, the elegant experiments of *The Behavior of Organisms*, the cumulative recorder, and the recognition of the extraordinary properties of schedules of reinforcement. His contributions to science, moreover, reflect the multiplicative enhancement of these skills; the instrumental ingenuity which made the cumulative recorder enabled the explosive exploration of the properties of schedules, while the theoretical skills guided the thrust into a trajectory of great efficiency.

Massive advances in science can affect society either by changing man's views of himself or by leading to substantive changes in his environment. The contributions of Copernicus and Darwin profoundly affected society through their philosophical implications, though they have made little difference to the contents of one's house or how one does things. Dalton's atomic theory and Faraday's electromagnetism had little influence on the nineteenth century establishment, although they led, through chemistry and electricity, to profound changes in man's surroundings. The work of a few people has affected society both ways; Pasteur's germs affected both people's view of life and also their beer, wine, and medical treatment. Skinner's discoveries in the field of the transactions of a higher organism with its environment will have a greater and more enduring effect on man's view of himself than the views of Freud. Meanwhile, slowly but increasingly, education is being influenced by Skinner's findings, and perhaps someday they may influence broadly how men dispense justice and punishment,

raise children, handle neuroses, organize an economic system and conduct international relations.

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